

The properties here considered are those which appertain to the points, if any, through which all the surfaces pass, or, as they may be termed, the *principal points* of the system, and they consist mainly in the nature of the contact of the hyperjacobian surfaces with the surface U, and the multiplicity of the hyperjacobian curve at the points in question.

The present investigation extends to the cases of two-branch contact of the given surface with a one-fold and with a two-fold pencil, and of three-branch contact with a four-fold pencil. In the latter case notice is also made of some properties appertaining to the points, if any, where all the surfaces touch one another, or, as they may be termed, the *secondary points* of the system. In particular it is shown that in the case of common, or two-branch, contact and a one-fold pencil the jacobian curve has a double point at the principal points; while in the case of three-branch contact and a four-fold pencil the hyperjacobian curve has a triple point at the same points.

II. "On the Length of the Spark from a Voltaic Battery in different Gases at ordinary Atmospheric Pressures." By WARREN DE LA RUE, M.A., D.C.L., F.R.S., and HUGO W. MÜLLER, Ph.D., F.R.S. Received May 17, 1877.

We venture, in anticipation of a more detailed account, in course of preparation, of our experiments with the chloride-of-silver battery which have engaged our attention for more than three years, to lay before the Society the results of some investigations we were induced to make in consequence of phenomena we have observed in the voltaic discharge in different residual gases contained in vacuum tubes. We have found, as we anticipated we should do, that the length of the spark at ordinary atmospheric pressures in the following gases is the longest in the order in which they are enumerated—hydrogen, nitrogen, air, oxygen, carbonic acid—it being nearly twice as long in hydrogen as in air. The spark in air between a point (positive) and a plate (negative) with our battery of 8040 cells is about 0·34 in., and in hydrogen 0·60. We may mention that we are making up our battery to 10,440 cells. The length of the spark does not appear to be dependent on the specific gravity of the gas, but may have some relation to its viscosity.